Redacted text is non-responsive and Exempt Delib Process

Damien Houlihan/R1/USEPA/US
10/10/2012 12:54 PM

To David Webster
cc
bcc
Subject Re: Fw: Training Request

[redacted]

Damien Houlihan, Chief
Industrial Permits Section
Office of Ecosystem Protection
US EPA

(617) 918-1586

David Webster What do you think? If you are supportive, she sh... 10/09/2012 04:42:16 PM

From: David Webster/R1/USEPA/US
To: Damien Houlihan/R1/USEPA/US@EPA
Date: 10/09/2012 04:42 PM
Subject: Fw: Training Request

What do you think?
If you are supportive, she should do a training request form. (probably a TA also, but not the reservations)
----- Forwarded by David Webster/R1/USEPA/US on 10/09/2012 04:41 PM -----

From: Sharon DeMeo/R1/USEPA/US
To: David Webster/R1/USEPA/US@EPA
Cc: Damien Houlihan/R1/USEPA/US@EPA
Date: 10/09/2012 03:41 PM
Subject: Re: Training Request

Hi Dave,

That is the title of the conference. Here are some of the technical sessions (from the website http://www.eswp.com/water/technical_program.htm):

MONDAY

21st Century Water Challenges : Designing and Operating ZLD Plants
Zero Liquid Discharge (ZLD) system is a system where no water leaves the boundary of the facility. In the recent times, regulations have become tough enough to make ZLD a feasible and economical option. However, it is inherently more complicated as it requires every drop of wastewater produced to be retreated, reused and eventually concentrated to solid waste. We will be discussing some of these challenges and remedies in this session.

IWC 12-13: *No Easy Answers : ZLD Improvement Options for a 720-MW Power Generation Facility*
Daniel Sampson, WorleyParsons, Vallejo, CA

The water treatment infrastructure for a relatively new 720-MW power generation facility includes a Zero Liquid Discharge (ZLD) system. The ZLD system receives cooling tower blowdown as the primary feedwater. The ZLD system allowed unrestricted power plant operation for the first three years following initial power plant commissioning, but ZLD system bottlenecks restricted plant operation and required a significant amount of off-site wastewater disposal in subsequent years.

The system as currently configured consists of a fairly typical power plant ZLD system with six basic processes: cold-lime softening, multimedia filtration, wastewater reverse osmosis, brine concentrator (BC), brine crystallizer
(BXtal), belt filter press (BFP).
This paper examines the plant's ZLD system in detail, focusing on the following questions:
1. Why is the ZLD system a problem now when it wasn't a problem in the past?
2. What process improvements have been attempted in the past and with what results?
3. What options exist for eliminating or mitigating the ZLD process bottlenecks and at what cost?
The discussion answers these questions with the goal of providing a clear understanding where the plant is now, how it got here, where it can go in the future, and how much it will cost to get there.

IWC 12-14: *A Unique All Membrane Integrated Makeup and Zero Liquid Discharge System*
Gerald Alexander, Siemens Industries, Inc., La Canada, CA

The growing trend to limit the use of fresh water while minimizing, if not totally eliminating the discharge of wastewater in the Power Industry has made the need to provide an integrated approach a critical factor. This Paper describes how the combination of off-site service and a wastewater design that combines precipitation with microfiltration was the solution for the Harry Allen Gas Turbine Combined Cycle power plant. The virtually all membrane design operates at an overall recovery of 95% while discharging a stream of wastewater to evaporation ponds and trucking solids off-site. The feedwater to the plant is variable originating from three different water sources; while the wastewater is a combination of reverse osmosis concentrate, steam generator blowdown, evaporative cooler blowdown, wet surface air cooler blowdown, multimedia backwash water, oil/water separator wastes, and other service waste waters. This design overcomes many of the shortcomings of a conventional or a thermal approach which would have much higher capital and operating costs.

IWC 12-15: *Treatment of Cooling Tower Blowdown Water with Membranes in a Zero Liquid Discharge Power Plant*
Marvin Drake, Indiantown Cogeneration LP, Indiantown, FL

Reuse of process and waste water in power plants has become increasingly important over the past decade. The Indiantown Cogeneration plant in Florida (360 MW capacity) has recently modified their zero liquid discharge scheme to incorporate the use of microfiltration and reverse osmosis technology to treat the blowdown from their cooling tower. There are three identified sources for make-up water at the plant---grey water, highly saline and moderately saline well water and highly organic surface water, or a combination of these waters. The filtered make up water is sent as feed to the cooling tower. Blowdown from the cooling tower was originally sent to two brine concentrators and the distillate from the brine concentrator was utilized as boiler feed water. The plant desired flexibility in the source of makeup water to the cooling tower. It was also desirable to replace the brine concentrators completely since they suffered from skin cracking problems, requiring expensive upgrades. The reduction of parasitic load by elimination of the brine concentrators was an attractive driver as well.

Extensive trials were conducted with a membrane system consisting of a hollow fiber microfiltration integrated with a reverse osmosis unit. The results are discussed in detail in the presentation. The membrane system allowed the brine concentrators to be completely replaced. The results demonstrated that the membrane system generated very high quality permeate that could be used as boiler feed. The reject of the RO system could be processed in the existing spray drier absorber system (dry scrubber), thereby implementing zero liquid discharge.

The Integrated Membrane System was commissioned in 2011 and has been operating smoothly for over 8 months. Operating field data for the system is included in the presentation. Preliminary indications are that a return on investment would be achieved within three years.

IWC 12-16: *Zero-Liquid Discharge System at Progress Energy Mayo Generation Station*
Matthias Loewenberg, GEA Process Engineering Inc., Columbia, MD

Progress Energy is currently installing a new Zero-Liquid Discharge treatment system for Flue-Gas

Desulfurization Waste Water at their Mayo Generation Station in Roxboro NC. The system, designed and supplied by GEA Progress Engineering Inc., helps Progress Energy's continuous commitment to provide safe, reliable and environmental friendly energy generation. The Zero-Liquid Discharge addition to their existing FGD scrubber supports compliance with tight NPDES wastewater discharge regulations. The Partial Zero-Liquid Discharge system consists of proven falling film evaporator technology with a secondary forced circulation evaporator in order to reduce the FGD blow down volume significantly. The resulting concentrated brine will be mixed with Plant fly ash and disposed in a new on-site landfill. The distillate water will be used in the Plant systems, reducing the make-up water demand.

Numerous treatment options were considered for this facility, however ZLD was chosen based on multi-pollutant removal ability, proven technology, and cost. This paper will outline the methodology behind the selection of this Partial Zero-Liquid Discharge approach with respect to environmental compliance.

Challenges in FGD Waste Water Treatment

This session reviews recent developments in Flue gas desulfurization system design, operation, and technology development which will provide insight and valuable information.

IWC 12-25: *FGD Evaporation Plant Operations*

J. Michael Marlett, Aquatech International Corp., Hartland, WI

Environmental quality remains a high priority in the power industry. These quality requirements result in the advancement of treatment techniques to provide plant discharges, air and water, to be minimized by reuse or of a quality that is either equal or higher in purity of the influents. Applications of existing technology are often employed but not validated with reports of performance. FGD wastewater treatment methods have centered mostly on physical and biological methods. Zero Liquid Discharge thermal solutions have been applied and are presently in use. The potential users and the EPA have yet to determine if thermal treatment techniques are the best available technology for this pollution source. This paper is a report on the operation of the plants in Italy that are operated and maintained by ENEL. Five plants were installed at ENEL power plants in Italy. They have been operating for 4 years. How have they lived up to the expectations regarding expected operation? This paper is a report of the operation of the units at ENEL 4 years after their startup.

IWC 12-26: *Selenite and Selenate Removal by Functionalized Alumina Adsorption Technology*

Nancy Sherwood, MAR Systems Inc., Solon, OH

Selenium speciation presents unique challenges for removal to low ppb trace levels. The selenite oxyanion is much more readily removed from water by adsorption technology in flow-through column studies than the selenate oxyanion. Selenate removal however, is key to wastewater decontamination in the coal mine process and FGD scrubber water markets. The removal of both species is discussed as a function of water quality, pH and temperature. Water conditioning pretreatment options that improve selenate removal by adsorbent technology is discussed and treatment case histories providing selenium removal in coal mine process water ponds to very low levels of 1-2 ppb selenium are provided.

IWC 12-27: *Ash Pond Replacement Therapy*

Thomas Higgins, CH2M HILL, Chantilly, VA

In this presentation, CH2M HILL will convey the following:
1. A review of the regulatory drivers pushing the elimination of pond-based flue gas desulfurization (FGD) wastewater and ash transport (sluicing) and disposal (pond-landfills) management. This review will include an
overview of the treatment technologies being considered by EPA in setting Best Available Technology limits—physical/chemical treatment, biological treatment, and zero liquid discharge (ZLD).
2. Methods used for collecting, and typical data on, the following: flow and composition of wastewater streams;
development of site-specific design bases; characterization of typical wastewater flows; reuse of

wastewater to
reduce discharges; and use of mass balance and chemistry modeling tools to evaluate reuse, treatment, and
discharge strategies to meet these new limits.
3. Concepts on using existing evaporation (from cooling towers and FGD absorbers), or utilizing blowdown water
for conditioning of flyash, and other water reuse and conservation measures to reduce the amount of wastewater
requiring treatment.
4. Process “tips and tricks” and engineering concepts for ash-pond replacement systems, including provisions for
water reuse or more stringent future effluent limitations.
5. Example ash pond replacement treatment systems, one of which was recently placed in service.

IWC 12-28: *Removal of Selenium from Aqueous Waste Streams*
Anna Casasus, Kemira, Atlanta, GA

Selenium is a micronutrient that, while essential to life in low concentrations, is bioaccumulative, threatening aqueous biota and those higher in the food chain. Thus, the removal of selenium from wastewaters is a technical challenge that is increasingly gaining interest from a number of industries. As regulatory limits become more stringent, a solution that can consistently achieve low effluent levels is highly desirable.
Kemira is developing technologies targeting the removal of selenium to trace concentrations from a number of aqueous streams resulting from coal processing and utilization. Research has focused on understanding and/or manipulating the effects of water matrix parameters, such as the species of selenium present, pH, and competing ion concentrations, among others. The objective is to develop technologies that will achieve high levels of selenium removal while minimizing the formation of a secondary waste, as well as the potential for leaching after disposal.
This paper will present an overview of the characterization of selenium present in wastewaters, since both the oxidation state of selenium and the pH play a key role in removal efficiencies. This is especially important in flue gas desulfurization (FGD) streams where high sulfate levels can interfere, particularly with the removal of selenate, due to the similarities of the oxyanions. While greater than 90% removal has been demonstrated through optimization to date, work is ongoing to further improve the treatment to meet the stringent discharge limits in place or proposed in many areas.

TUESDAY

Pilot and Full Scale Operating Experiences for FGD Wastewater Treatment
The unique combination of constituents found in FGD wastewater streams present challenges to both equipment process suppliers and plant operations. Existing receiving stream discharge limits and upcoming regulations regarding FGD wastewater have encouraged the industry to develop creative technologies for wastewater management. This session will review pilot and full scale FGD wastewater treatment technology experiences designed for reduction of nitrates, boron, nutrients, selenium and total dissolved solids from FGD wastewater.

IWC 12-41: *Design and Start-up of a Full-scale Biological Seleniuim Removal System for Flue Gas Desulfurization (FGD) Wastewater from a Power Generating Station* **Antonio Lau, Infilco Degremont, Inc., Richmond, VA**

This paper describes the design, start-up and commissioning of a full-scale biological treatment system that was installed at a coal-fired power generating station to remove selenium and nitrates from a Flue Gas Desulfurization (FGD) blowdown stream. The new patented iBIO® wastewater treatment (WWT) system was first pilot tested and it is based on a suspended growth continuous-stirred-tank anaerobic reactor that has been seeded with a source of commonly available anaerobic microorganisms which were subsequently acclimated to remove selenium from the FGD wastewater. This new innovative WWT system was integrated into the power station’s existing WWT unit to provide the additional selenium removal capability from the wastewater.

This demonstrated biological selenium removal treatment system provides a robust and cost-effective alternate technology to coal-fired utilities that use FGD wet scrubbers to control their sulfur oxide (SOx) emissions and also need to consistently meet the more stringent low-level selenium effluent permit limits.

IWC 12-42: *Start-up and Operation of a Full Scale, No Liquid Discharge Boron Removal Process for FGD Waste Water*
H Robert Goltz, The Dow Chemcial Company, Midland, MI

Boron can be present in the wastewater of FGD scrubbers and must be removed. Dow Water & Process Solutions and Infilco Degremont, Inc. have developed an end-of-pipe system to remove boron contamination down to required discharge limits. This report will present the results of a successful plant start-up and operations.

IWC 12-43: *A Pilot Demonstration of Spray Dryer Evaporation as a Method to Treat Power Plant FGD Wastewater*
Jason (Xinjun) Teng, Southern Company, Birmingham, AL

The United States Environmental Protection Agency (USEPA) is expected to limit the concentrations of species including selenium and mercury allowed to be discharged in wastewater from wet flue gas desulfurization (FGD) units. One treatment option is spray drying evaporation, a Zero Liquid Discharge (ZLD) technology. In this process, FGD wastewater droplets are sprayed concurrently with hot flue gases and the dried solids are collected using an electrostatic precipitator (ESP) or baghouse.
A pilot scale test was conducted at plant Gadsden of Southern Company to demonstrate this technology. The droplet mass mean diameter was adjusted to 40Âμm during the test. A thermal model was established. The model showed that to evaporate 200 gpm FGD wastewater with 40,000ppm chloride, with an inlet and outlet gas temperatures of 620Â°F and 400Â°F, the required flue gas flow was estimated to be 0.95Ã–106 acfm. Data illuminated that mercury in the FGD wastewater did not evaporate back to the flue gas. Instead, all the mercury deposited in the solids. Addition of active carbon could further remove the mercury from flue gas. Around 99% of the chloride in the wastewater was crystallized, and the left 1% was evaporated into the flue gas. An increased baghouse pressure drop was observed during the test.

IWC 12-44: *Constructed Wetland Treatment System for FGD Wastewater Treatment - Pilot Project Final Results*
Christopher Snider, Burns & McDonnell Engineering Company, Kansas City, MO

Constructed wetland treatment systems use natural biological processes to reduce the concentrations of constituents in the wastewater and have demonstrated promise for the treatment of FGD wastewater. However, limited industry and academic research has been conducted and very few full scale applications have been undertaken. Constructed wetland treatment systems have been used effectively for the treatment of other industrial and municipal wastewaters but widespread use in the power generation sector has not yet developed due to lack of research and project experience.

A major power producer has decided to undertake a constructed wetland treatment system pilot project to evaluate the technology. The constructed wetland, currently in operation, is approximately 2 acres in size and treats approximately 7 percent of the plant FGD wastewater stream. The initial Pilot results were presented at the IWC 2010 Conference. This presentation will cover the final Pilot results and will explain the decision making process implemented when faced with the decision to build the full scale constructed wetland treatment system within a critical time frame.

FGD Wastewater Chemistry and Treatment
FGD blowdown streams continue to be complex wastewaters that require innovative methods of measurement and treatment. Without a true understanding of the blowdown chemistry, it can be difficult to pin point the proper treatment process. Once a treatment process is identified, balancing water within the facility becomes a challenge.

IWC 12-57: *Chemistry of FGD Blowdown*
Thomas Higgins, CH2MHILL, Chantilly, VA

In the past, zero liquid discharge has been used for wastewater management in the power industry primarily on cooling tower blowdown, and in locations where water is scarce or there were limited options for discharging the wastewater. As limits for metals are lowered and new parameters are being regulated, the complexity and cost of treatment to meet these low limits and add on treatment technology has made zero liquid discharge a more viable option. TDS of Cooling tower blowdown is primarily sodium chloride, which is relatively straightforward to treat. Sodium chloride is abundant in nature and streams containing high concentrations exist (like seawater) and can be concentrated to a high level given the high solubility of sodium chloride in water. FGD blowdown consists mainly as calcium and magnesium salts of chloride and sulfate, with chloride levels varying depending on the metallurgy of the scrubber. Chloride levels can vary from 3,000 to 35,000 mg/L. The characteristics of the blowdown will vary depending on the chloride concentration which drives the number of times the water can be concentrated. The magnesium to calcium ratio of the limestone will drive the amount of magnesium in solution. The sulfur to chlorine ratio of the the coal will determine whether the blowdown will be dominated by sulfate or chloride. A coal high in chloride combined with a high calcium limestone will produce a blowdown high in calcium and chloride and low in magnesium and sulfate. A high sulfur coal and high magnesium limestone will produce a low calcium, high magnesium sulfate and chloride blowdown. Concentration of FGD scrubber blowdown produces a stream that is primarily calcium and magnesium chloride. This presentation will discuss the water chemistry associated with concentrating and crystallizing FGD blowdown, and present a commercial model used in the evaluation.

IWC 12-58: *Extending the Linear Dynamic Range for Measurements of Selenium in Complex Flue Gas Desulfurization Water Systems By Inductively Coupled Plasma Mass Spectrometry*
Frank Kero, Kemira, Atlanta, GA

The efficacy of novel treatment formulations that aim to sequester, precipitate or encapsulate anthropogenic pollutants like selenium (Se) from a bulk environmental matrix has been determined by inductively coupled plasma mass spectrometry (ICP-MS). This analytical challenge associated with a linear dynamic range from untreated ppm levels to treated ppb levels is compounded by variable measurement interferences during process. Strategies to mitigate this issue via offline sample preparation methods (e.g. microwave digestion, solid phase extraction) and the optimization of online resolution elements (e.g. optimi! zation of the octopole collision cell parameters and the evaluation of quadrupole mass spectrometer scan modes) will be discussed. The limitations of linearity (i.e. accuracy, precision, detection limits, matrix equivalency to calibration standards, %recovery) for this analytical method have been demonstrated for field samples collected from flue gas desulfurization (FGD) waters. A two way ANOVA design of experiment was employed to evaluate sources of variability in measurement. A review of post-data treatment correction equations will also be presented.

IWC 12-59: *Pilot-Scale Demonstration of the hZVI Process for Treating FGD Wastewater*
Yongheng Huang, Texas A&M University, College Station, TX

The hybrid zero-valent-iron (hZVI) process is a novel chemical treatment process that has shown great potential in previous laboratory and field bench-scale tests for removing selenium, mercury, and nutrients from the flue-gas-desulfurization wastewater. In this study, a pilot-scale demonstration was conducted to continuously treat 1-2 gpm of the FGD wastewater at a coal-fired power plant for five months. Results show that the hZVI process could simultaneously reduce selenate-Se from 1-3 ppm to < 10 ppb and mercury from over 100 ppb to < 10 ppt, in compliance with new stringent effluent discharge limits planned! by the U.S.EPA for Se and Hg. Moreover, the process efficiently removed a broad spectrum of heavy metals such as As(III), As(V), Cr(VI), Cd(II), Pb(II) and Cu(II) from ppm to near or sub-ppb level. A 3-stage hZVI reactor with a combined hydraulic retention time of 8-12 h was sufficient for Se treatment and a single stage for Hg and other heavy metals. The process had a competitive economics and consumed ~0.3 kg ZVI per 1 m3 FGD wastewater treated at a cost of about $0.6/m3. Solid waste production and energy consumption, estimated at

IWC 12-60: *Sulfate Discharge Considerations for FGD System Design*
Diane Martini, Sargent & Lundy, LLC, Chicago, IL

Sulfate and TDS are becoming critical issues in surface water quality. A utility in Indiana with sulfate discharge limit was required to install an FGD system. There were concerns that the FGD blowdown could increase the sulfate discharge from the plant beyond the discharge limit. The plant was also has water withdrawal limits and water return requirements to maintain the river level. Working with the sulfate mass balance through the plant, and in cooperation with the FGD vendor, a water balance was developed that maximized the use of plant cooling tower blow down as makeup to the FGD process. The paper will describe how cooling tower blow down and limited amounts of fresh service water were employed to optimize the water balance such that the total sulfate mass discharge from the facility will be reduced after the FGD system comes on line.

WEDNESDAY

Addressing Water Treatment Challenges at Power Plants
Water is the lifeblood of a power plant, not only in the steam-condensate cycle, but also for cooling. The U.S. EPA is in the process of revising the effluent limitations guidelines and standards (ELGs) for the steam electric power generating point source category. This session will address reliable sources of cooling water, technologies which can be used to achieve those anticipated ELGs and techniques which can be applied to optimize recycle/reuse systems.

IWC 12-73: *Deciphering the Choices in Treatment Required to Meet EPA Effluent Limitation Guidelines at Coal-Fired Generating Stations* James Harwood, GE Power & Water, Oakville, ON Canada

In 2009, US EPA under authority of the Clean Water Act has elected to proceed with rulemaking in the form of revised Effluent Limitation Guidelines (ELG's) for the steam electrical power generating industry. Draft ELGs are scheduled for public release in July 2012 with final release scheduled for 2014. The standards will redefine the wastewater management requirements for many coal-fired power plants. The ELG's are based on best available technologies with a consideration for economic impacts. As a result, utilities will need to navigate through a host of different technological approaches and considerations in order to achieve expected limits for constituents such as selenium, mercury, boron and total dissolved solids (TDS) among others. These standards will be implemented through the National Pollutant Discharge Elimination System (NPDES) permit limits. For many utilities, tighter NPDES limits will result in the implementation of treatment solutions for flue gas desulfurization (FGD) and ash handling streams. Utilities, consulting engineers and treatment technology providers will be required to work together to evaluate, select, procure, construct and commission new treatment facilities. At the same time, careful consideration must be given to the challenges faced in implementing solutions in these applications. Implications due to dynamic water qualities, variable fuel sources, and technology capabilities, concurrent implementation of other air and water controls, and vendor and consultant experience in this space must all be analyzed. This paper will examine the decisions faced by facilities as they navigate through these choices in order to successfully and economically meet these new requirements in the changing environment.

IWC 12-74: *Using Reclaimed Municipal Wastewater for Power Plant Cooling and Process Water Systems*
Michael Wilson, CH2M Hill, Boston, MA

The reclamation of treated municipal wastewater for power plant cooling water systems is a complex and sensitive decision process due to many often conflicting factors. The U.S. Department of Energy's (DOE's) National Energy Technology Laboratory (NETL) determined that alternative sources of water for use at power plants which included reclaimed water are an innovative source of cooling water for electric generating facilities (Feeley 2005). The design of these industrial cooling water systems presents several challenges to the water reuse professional and may include combinations of wastewater biological process design, elements of physical chemical treatment and industrial high purity water systems. The

use of reclaimed water by power plants for cooling water systems is an important sustainability principal and is becoming more prevalent watersheds due to stresses being placed on habitat, potable water systems and consumptive use. This in fact is a triple bottom line advantage since reclaimed water that is recycled for power production is the definitive example of the energy-water nexus. This paper presents the design basis of a 7 mgd reclaimed municipal water treatment plant for an East Coast Power facility. The biological and physical chemical treatment processes will be reviewed including methods of meeting cooling and process water quality objectives for carbonaceous biochemical oxygen demand, total suspended solids, ammonia removal, iron and manganese removal, chlorine residual and pH control systems and value chain associated with the economic factors.

IWC 12-76: *Biofouling of Water Systems*
Sarahann Rackl (Dow), Marrone Bio Innovations, Davis, CA

Throughout North America and Europe, zebra and quagga mussels are crippling industrial and commercial operations by restricting water intake in heat exchangers, condensers, and cooling systems, and by damaging infrastructure and equipment. United States Congressional researchers estimated that zebra mussels alone cost the power industry $3.1 billion during 1993–1999, and had more than a $5 billion impact on industries, businesses, and communities during the same period. Unfortunately, the battle against these invasive, destructive mussels' rages on intensified by their unrelenting spread and complicated by increasing regulatory pressure to limit the use of dangerous chemicals in service water systems. Today, facility operators are faced with what appear to be conflicting goals—controlling mussels while managing shell debris, and achieving a high level of efficacy without harming the environment or putting the facility or employees at risk.

This presentation shows the results of mussel control studies at power facilities in North America and Europe, including a U.S. Bureau of Reclamation project. These studies indicate that a recently approved molluscicide called Zequanox® can control zebra and quagga mussel populations without harming humans, infrastructure, non-target species, or the environment. The presentation reviews various treatment methods and addresses the advantages of controlling mussel population at different life stages, highlighting the tradeoffs between application frequency and shell debris management. Finally, this presentation previews the studies to be conducted in 2012.

-----David Webster/R1/USEPA/US wrote: -----
To: Sharon DeMeo/R1/USEPA/US@EPA
From: David Webster/R1/USEPA/US
Date: 10/09/2012 02:36PM
Cc: Damien Houlihan/R1/USEPA/US@EPA
Subject: Re: Training Request

What's the title of the The International Water Conference? Are there specific presentations on waste water from FGD operations?

Sharon DeMeo---10/09/2012 12:53:12 PM---Hi Damien and Dave, Here are the specifics of my training request: · Title of course (or subject

From: Sharon DeMeo/R1/USEPA/US
To: Damien Houlihan/R1/USEPA/US@EPA, David Webster/R1/USEPA/US@EPA
Date: 10/09/2012 12:53 PM
Subject: Training Request

Hi Damien and Dave,

Here are the specifics of my training request:

- Title of course (or subject, if not known) - The International Water Conference

- Number of hours in training - 26+ (there are added workshops on Wednesday afternoon and Thursday of this week; one of these on Thursday afternoon, November 8, 2012, is titled *Thermal Zero Liquid Discharge Processes* but would cost an additional $250 and I would need to stay an extra day)

- Date(s) of course (or time frame, if specific date is unknown) - Monday, November 5, 2012 to Thursday, November, 8, 2012
- Cost of course/training - Registration is $375 (after 10/14/12 it is $425)
- Location of course/training - San Antonio, Texas
- Will this also require travel money? Yes - meals, lodging, and transportation.

- Objective – (brief) - To attend technical sessions and learn the latest information about new applications available and application issues that have been documented in the industrial water treatment industry, specifically flue gas desulfurization wastewater treatment and zero liquid discharge technologies.

Please let me know if you have any questions or would like to discuss more details regarding the conference. I hope this opportunity is within our budget but I certainly understand if it is not. Thank you.

Sharon